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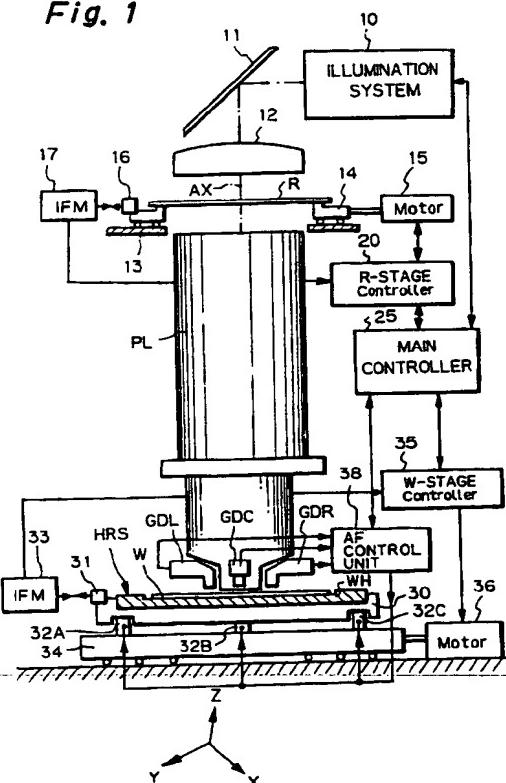
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(54) Focusing and tilting adjustment system for lithography aligner, manufacturing apparatus or inspection apparatus

(57) A focusing apparatus having an objective optical system for optically manufacturing a workpiece, forming a desired pattern on a surface of a workpiece or inspecting a pattern on a workpiece and used to adjust the state of focusing between the surface of the workpiece (W) and the objective optical system (PL). The focusing apparatus has a first detection system having a detection area at a first position located outside the field of the objective optical system, a second detection system having a detection area at a second position located outside the field of the objective optical system and spaced apart from the first position, and a third detection system having a detection area at a third position located outside the field of the objective optical system and spaced apart from each of the first and second positions. A calculator (38) calculates a deviation between a first focus position and a target focus position and temporarily stores a second focus position at the time of detection made by the first detection system. A controller (35) controls focusing on the surface of the workpiece on the basis of the calculated deviation, the stored second focus position and a third focus position when the area on the workpiece corresponding to the detection area of the first detection system is positioned in the field of the objective optical system by relative movement of the workpiece and the objective optical system.

Fig. 1



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EUROPEAN SEARCH REPORT

Application Number
EP 97 30 7868

DOCUMENTS CONSIDERED TO BE RELEVANT																							
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)																				
D, A	US 5 448 332 A (SAKAKIBARA YASUYUKI ET AL) 5 September 1995 * column 5, line 54 - line 63 * * column 6, line 27 - line 41 * * column 21, line 6 - column 22, line 12 * * column 25, line 4 - column 26, line 7 * * figures 3-5 * ---	1,10,15, 21,22,27	G03F7/20 G03F9/02																				
A	EP 0 585 041 A (CANON KK) 2 March 1994 * page 9, line 3 - line 18 * * page 16, line 20 - line 28 * * figures 8-10,24 *	1,10,15, 21,22,27																					
A	US 5 118 957 A (SUZUKI AKIYOSHI ET AL) 2 June 1992 * column 1, line 67 - column 2, line 62 * * column 6, line 55 - column 7, line 64 * * column 9, line 18 - line 26 * * figures 1-8 *	1,10,15, 21,22,27																					
A	PATENT ABSTRACTS OF JAPAN vol. 096, no. 009, 30 September 1996 -& JP 08 124842 A (NIKON CORP), 17 May 1996 * abstract; figures * -& US 5 798 822 A (SAIKI KAZUAKI ET AL) 25 August 1998 * column 2, line 32 - column 3, line 26 * * figures 1-3 *	1,10,15, 21,22,27	G03F TECHNICAL FIELDS SEARCHED (Int.Cl.6)																				
<p>The present search report has been drawn up for all claims</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Place of search</td> <td style="width: 33%;">Date of completion of the search</td> <td style="width: 34%;">Examiner</td> </tr> <tr> <td>THE HAGUE</td> <td>11 March 1999</td> <td>HERYET, C</td> </tr> <tr> <td colspan="3"> CATEGORY OF CITED DOCUMENTS <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">X : particularly relevant if taken alone</td> <td style="width: 33%;">T : theory or principle underlying the invention</td> </tr> <tr> <td>Y : particularly relevant if combined with another document of the same category</td> <td>E : earlier patent document, but published on, or after the filing date</td> </tr> <tr> <td>Z : technological background</td> <td>D : document cited in the application</td> </tr> <tr> <td>O : non-written disclosure</td> <td>L : document cited for other reasons</td> </tr> <tr> <td>P : intermediate document</td> <td colspan="2">& : member of the same patent family, corresponding document</td> </tr> </table> </td> </tr> </table>				Place of search	Date of completion of the search	Examiner	THE HAGUE	11 March 1999	HERYET, C	CATEGORY OF CITED DOCUMENTS <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">X : particularly relevant if taken alone</td> <td style="width: 33%;">T : theory or principle underlying the invention</td> </tr> <tr> <td>Y : particularly relevant if combined with another document of the same category</td> <td>E : earlier patent document, but published on, or after the filing date</td> </tr> <tr> <td>Z : technological background</td> <td>D : document cited in the application</td> </tr> <tr> <td>O : non-written disclosure</td> <td>L : document cited for other reasons</td> </tr> <tr> <td>P : intermediate document</td> <td colspan="2">& : member of the same patent family, corresponding document</td> </tr> </table>			X : particularly relevant if taken alone	T : theory or principle underlying the invention	Y : particularly relevant if combined with another document of the same category	E : earlier patent document, but published on, or after the filing date	Z : technological background	D : document cited in the application	O : non-written disclosure	L : document cited for other reasons	P : intermediate document	& : member of the same patent family, corresponding document	
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Application Number
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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

- None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-23,27

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 97 30 7868

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-23, 27

Detection of focus error in projection exposure apparatus.

2. Claims: 24-26

Liquid immersion projection exposure apparatus.

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